

## CLAIMS

1. A hologram retrieval method comprising the steps of:  
irradiating a signal beam that has been modulated by a spatial  
light modulator using a data image to be retrieved onto  
5 holographic recording medium having digital information  
recorded thereon as data pages formed of a two-dimensional bit  
map image with each page being multiplexed to transmit a  
diffracted beam; and detecting a data image address provided  
to the signal beam using a resulting diffracted beam, wherein:

10 the data page is formed of a plurality of equally divided  
data blocks and a data image is formed within each data block  
by an encoding method for providing a certain number of ON  
pixels; and

the spatial light modulator encodes the data image to be  
15 retrieved by the encoding method to display it as block  
information on at least one retrieval data block associated  
with the data block and modulates a signal beam using the  
block information, and of resulting diffracted beams, a  
diffracted beam of the maximum intensity is used to identify  
20 an address of a data block and a data page containing a target  
data image.

2. The hologram retrieval method according to claim 1,  
wherein

all pixels in a retrieval data block other than a  
25 retrieval data block on which the block information is

displayed are OFF pixels.

3. The hologram retrieval method according to claim 1,  
wherein

part of data blocks in the data page is employed as a  
5 dedicated retrieved data block, and an encoding method is used  
to provide a larger number of ON pixels for a data image  
formed in the dedicated retrieved data block than for a data  
image of another data block.

4. The hologram retrieval method according to claim 2,  
10 wherein

part of data blocks in the data page is employed as a  
dedicated retrieved data block, and an encoding method is used  
to provide a larger number of ON pixels for a data image  
formed in the dedicated retrieved data block than for a data  
15 image of another data block.

5. The hologram retrieval method according to any one of  
claims 1 to 4, wherein

a beam diameter and an optical path of the signal beam  
are adjusted such that the signal beam passes substantially  
20 only through a retrieval data block displayed on the spatial  
modulator.

6. The hologram retrieval method according to any one of  
claims 1 to 4, wherein

the block information is sequentially displayed on the  
25 plurality of retrieval data blocks in the spatial light

modulator.

7. The hologram retrieval method according to claim 5, wherein

the block information is sequentially displayed on the plurality of retrieval data blocks in the spatial light modulator.

8. The hologram retrieval method according to claim 1, wherein

the block information is displayed at the same time on all retrieval data blocks in the spatial light modulator, and of a plurality of resulting diffracted beams, a diffracted beam of the maximum intensity is used to identify a data page containing the block information.

9. A hologram retrieval method comprising the steps of: irradiating a signal beam that has been modulated by a spatial light modulator using a data image to be retrieved onto a holographic recording medium having digital information recorded thereon as data pages formed of a two-dimensional bit map image with each page being multiplexed to transmit a diffracted beam; and detecting a data image address provided to the signal beam using a resulting diffracted beam, wherein:

the data page is formed of a plurality of equally divided data blocks and a data image is formed in each data block by an encoding method for providing a different number of ON pixels for each data block; and

the spatial light modulator encodes the same data image to be retrieved by the encoding method to display it as block information on all retrieval data blocks associated with the data block and modulates a signal beam using the block

5 information, and an amount of light of a resulting diffracted beam is used to identify an address of a data block and a data page containing a data image to be retrieved.

10. The hologram retrieval method according to any one of claims 1 to 4, wherein

10 a reproduction reference beam associated with the identified data page is used for irradiation to reproduce retrieval information.

11. The hologram retrieval method according to claim 5, wherein

15 a reproduction reference beam associated with the identified data page is used for irradiation to reproduce retrieval information.

12. The hologram retrieval method according to claim 6, wherein

20 a reproduction reference beam associated with the identified data page is used for irradiation to reproduce retrieval information.

13. The hologram retrieval method according to claim 8, wherein

25 a reproduction reference beam associated with the

identified data page is used for irradiation to reproduce retrieval information.

14. The hologram retrieval method according to claim 9, wherein

5       a reproduction reference beam associated with the identified data page is used for irradiation to reproduce retrieval information.

15. A holographic recording and reproducing apparatus comprising:

10       an object optical system and a reference optical system for directing an object beam and a reference beam to a holographic recording medium;

      a spatial light modulator provided in the object optical system to allow to-be-recorded digital information to be  
15 displayed as a data page formed of a two-dimensional bit map image, thereby being capable of modulating an object beam;

      a retrieval imaging device for receiving a plurality of diffracted beams produced when the holographic recording medium having a hologram recorded thereon is irradiated with a  
20 signal beam from the object optical system;

      a signal processing circuit for processing an output signal from the retrieval imaging device, and

      a reproduction imaging device for receiving a diffracted beam produced at the time of irradiation with a reproduction  
25 reference beam from the reference optical system, wherein:

the spatial light modulator is capable of displaying the digital information as an encoded data image on each of data blocks obtained by dividing the data page into a plurality of equal parts, and is capable of allowing a to-be-retrieved data image to be encoded by the same encoding method as for the data image and displayed as block information; and

the signal processing circuit identifies an address of a data page containing the data image based on a diffracted beam of the maximum intensity of the plurality of diffracted beams.

16. The holographic recording and reproducing apparatus according to claim 15, wherein

the spatial light modulator is configured such that all pixels in a retrieval data block other than a retrieval data block on which the block information is displayed are OFF pixels.

17. The holographic recording and reproducing apparatus according to claim 15, wherein

the spatial light modulator is designed such that part of data blocks in the data page is employed as a dedicated retrieved data block, and an encoding method is used to provide a larger number of ON pixels for a data image formed in the dedicated retrieved data block than for a data image of another data block.

18. The holographic recording and reproducing apparatus according to claim 16, wherein

the spatial light modulator is designed such that part of data blocks in the data page is employed as a dedicated retrieved data block, and an encoding method is used to provide a larger number of ON pixels for a data image formed in the dedicated retrieved data block than for a data image of another data block.

19. The holographic recording and reproducing apparatus according to any one of claims 15 to 18, wherein

the object optical system is configured such that a beam diameter and an optical path of the signal beam can be adjusted so that the signal beam passes substantially only through a retrieval data block displayed on the spatial modulator.

20. The holographic recording and reproducing apparatus according to any one of claims 15 to 18, wherein

the spatial light modulator is configured such that the block information can be sequentially displayed on the plurality of retrieval data blocks.

21. The holographic recording and reproducing apparatus according to claim 19, wherein

the spatial light modulator is configured such that the block information can be sequentially displayed on the plurality of retrieval data blocks.

22. The holographic recording and reproducing apparatus according to claim 15, wherein:

the spatial light modulator is configured such that the block information can be displayed at the same time on all retrieval data blocks in the spatial light modulator; and

the signal processing circuit is configured such that of a plurality of diffracted beams obtained from the retrieval imaging device, a diffracted beam of the maximum intensity is used to identify a data page containing the block information.

23. A holographic recording and reproducing apparatus comprising:

an object optical system and a reference optical system for directing an object beam and a reference beam to a holographic recording medium;

a spatial light modulator provided in the object optical system to allow to-be-recorded digital information to be displayed as a data page formed of a two-dimensional bit map image, thereby being capable of modulating an object beam;

a retrieval imaging device for receiving a plurality of diffracted beams produced when the holographic recording medium having a hologram recorded thereon is irradiated with a signal beam from the object optical system;

a signal processing circuit for processing an output signal from the retrieval imaging device; and

a reproduction imaging device for receiving a diffracted beam produced at the time of irradiation with a reproduction reference beam from the reference optical system, wherein



the spatial light modulator is capable of displaying the digital information as a data image, the data image being encoded by an encoding method for providing a different number of ON pixels for each data block, on each of data blocks  
5 obtained by dividing the data page into a plurality of equal parts, and is capable of allowing the to-be-retrieved data image to be encoded by the same encoding method as for the data image and displayed as block information, and

the signal processing circuit identifies an address of a  
10 data block and a data page containing a data image being retrieved based on an amount of diffracted light obtained from the retrieval imaging device.